

## CLAIMS

What is claimed is:

1. A method for forming a binary liquid crystal mixture with V-shaped switching electro-optic response, said method comprising:  
5 providing an achiral swallow-tailed compound; and  
doping an antiferroelectric liquid crystal material with said achiral swallow-tailed compound to generate a binary anti-ferroelectric liquid crystal mixture, wherein said binary antiferroelectric liquid crystal mixture with a first ferroelectric phase and displaying a first V-shaped switching electro-optic response in said first ferroelectric phase.  
10
2. The method according to Claim 1, wherein said achiral swallow-tailed compound comprises 2-propylpentyl-4 (4'-  
15 decyloxybiphenyl-4-carbonyloxy)benzoate.
3. The method according to Claim 1, wherein said achiral swallow-tailed compound comprises 2-propylpentyl 4-(4'-  
20 nonyloxybiphenyl-4-carbonyloxy)benzoate.
4. The method according to Claim 1, wherein said binary ferroelectric liquid crystal material further comprising an antiferroelectric phase, and displaying a double hysteresis switching.
- 25 5. The method according to Claim 4, wherein said antiferroelectric liquid crystal mixture comprises (S)-4-(1-

methylheptyloxy)carbonylphenyl 4'-octyloxy-4-biphenylcarboxylate.

6. The method according to Claim 1, wherein said doping said ferroelectric liquid crystal material with said achiral swallow-tailed compound to generate a binary ferroelectric liquid crystal mixture, wherein said binary ferroelectric liquid crystal mixture with a second ferroelectric phase, and displaying a second V-shaped switching electro-optic response.

7. The method according to Claim 1, wherein said ferroelectric liquid crystal material comprises 1-ethylpropyl (S)-2-[2-fluoro-4- (4'-decyloxybiphenylcarbonyloxybenzoyl)propanoate

8. A method for forming a binary liquid crystal mixture with V-shaped switching electro-optic response, said method comprising:  
providing an achiral swallow-tailed compound; and  
doping an antiferroelectric liquid crystal material with said achiral swallow-tailed compound to generate a binary antiferroelectric liquid crystal mixture, wherein said binary antiferroelectric liquid crystal mixture with a ferroelectric phase, and displaying a V-shaped switching in said ferroelectric phase.

9. The method according to Claim 8, wherein said achiral swallow-tailed compound comprises 2-propylpentyl-4 (4'-decyloxybiphenyl-4-carbonyloxy)benzoate.

10. The method according to Claim 8, wherein said antiferroelectric liquid crystal material comprises (S)-4-(1-methylheptyloxy) carbonylphenyl 4'-octyloxy-4-biphenylcarboxylate.

5 11. The method according to Claim 8, wherein said antiferroelectric liquid crystal compound comprises an antiferroelectric phase, and displaying a double hysteresis switching.

12. A method for forming a binary liquid crystal mixture with a  
10 V-shaped switching electro-optic response, said method comprising:  
providing an achiral swallow-tailed compound; and  
doping a ferroelectric liquid crystal material with said achiral  
swallow-tailed compound to generate a binary ferroelectric liquid  
crystal mixture, wherein said binary ferroelectric liquid crystal mixture  
15 with a ferroelectric phase, and displaying a V-shaped switching  
electro-optic response in said ferroelectric phase.

13. The method according to Claim 12, wherein said achiral  
swallow-tailed compound comprises 2-propylpentyl 4-(4'-  
20 nonyloxybiphenyl-4-carbonyloxy) benzoate.

14. The method according to Claim 12, wherein said ferroelectric liquid crystal material comprises 1-ethylpropyl (S)-2-[2-fluoro-4-(4'-decyloxybiphenylcarbonyloxybenzoyl)propanoate.